

TRICHOBRANCHIDAE (POLYCHAETA) FROM SHALLOW WARM WATER AREAS IN THE WESTERN ATLANTIC OCEAN

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Abstract.—Three new species of *Terebellides* from shallow tropical waters are described: *T. parvus* from Belize, *T. carmenensis* from Mexico, and *T. lanai* from Brazil. *Terebellides klemani* and *T. anguicomus* are redescribed and recognized as distinct.

The most common trichobranchids in shallow water in Belize and the Mexican shallow-water lagoons along the Gulf of Mexico belong to a species group which also includes *Terebellides klemani* Kinberg, 1867 and *T. anguicomus* Müller, 1858. *Terebellides klemani* has been considered a synonym of *T. anguicomus* (see Hessle, 1917). After examining specimens from Belize and closely similar specimens from Mexico, the types of *T. klemani* and specimens collected near the type areas of both previously named species, we believe that we can recognize a series of similar, but distinct, species all of which would have been subsumed under Hessle's concept of *T. anguicomus*.

Our study parallels the analysis of the "cosmopolitan species" *T. stroemi* Sars, 1835 published by Williams (1984). Williams used several characters rarely noted in descriptions of trichobranchids to subdivide *Terebellides stroemi* s. l.; our observations generally support her conclusions about the importance of characters not previously used to delimit species.

Williams did examine specimens from Central America and Northern South America, but was not able to assign them to species other than to note that they did not belong in the species-complex she was analyzing. Her specimens from the region of interest in this study appear to be closely similar to *T. klemani* and to other species described in this study.

Materials and methods.—Material for this study came from several sources:

1) Belize: More than 550 specimens collected by the second author and B. F. Kensley (1979–1981) as part of the SWAMP (Smithsonian Western Atlantic Mangrove program) directed by Klaus Rützler. The first 10 cores were taken with a corer of 25 cm diameter; the rest with a 10.4 cm diameter corer. All were taken to a substrate depth of approximately 10 cm. Details of the collection, screening and preservation methods can be found in Solis-Weiss & Fauchald (1989).

Station list.—West Bay, Twin Cays, Belize, 10–50 cm water depth; root mat of *Rhizophora mangle*, covered with *Caulerpa verticillata*. Core numbers: M1–M3; M5–M13; M16; M20; M24–M28; M31–M36; M39–M42; M45–M47; M51–M55; M58–M60; M63; M68–M69; M71; M88; M90; M94–M96; M100–M101; M107; M133; M139–M148.

West side of middle island, Blue Ground Range, Belize, 10–50 cm water depth, root mat of *Rhizophora mangle* covered with *Caulerpa verticillata*. Core numbers: M65; M75; M80–M81; M84; M150.

2) Mexico: Specimens from Laguna de Terminos, Campeche collected by the senior author and P. Hernandez-Alcantara (1983–1984) as part of the collaborative project UNAM-CONACYT-QCMABFR-001698. Specimens in sediments associated with *R. mangle*, as in Belize, and at similar water depths. Algal mat was absent. The samples were taken with a 25 cm corer to a substrate depth of 20 cm. Details of sam-

pling methods, localities, screening and preservation were described elsewhere (Hernández-Alcantara 1985).

3) Brazil: This material was kindly sent us by Dr. Paulo da Cunha Lana and collected either by him in Baía de Paranaguá (1981–1986), or during “Operação Sueste” (1982–1983) on the R/V *Almirante Saldanha*; it represents part of the material used by the third author during his academic studies. Sampling localities are given in the text.

4) Type material of *Terebellides klemani* housed in Riksmuseet, Stockholm, Sweden.

For examination of gland patterns, the specimens were stained with a methylene blue solution and rinsed with 70% ethanol to remove excessive staining, following methods suggested by Banse (1970).

Measurements were made to the nearest $\frac{1}{10}$ mm. All length measures were taken from the posterior edge of the prostomium; the flattened, foliose prostomium varies a great deal in length and shape with fixation as do the tentacles.

The morphological terminology was derived from Fauchald (1977) and Williams (1984).

Abbreviations: Capital M in the station data refers to the location of the samples in the mangroves; specimens from these samples are deposited as indicated in the text. RM-Naturhistoriska Riksmuseet, Stockholm, Sweden; USNM indicates samples cataloged in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Systematic Section

Family Trichobranchidae Malmgren, 1866
Genus *Terebellides* Sars, 1835

Key to Species of *Terebellides* of the *anguicomus* Group

1. 17 thoracic setigers, first uncini on setiger 5 *T. anguicomus*
- 18 thoracic setigers, first uncini on setiger 6 2
2. Anterior dorsum with distinct hump *T. carmenensis*
- Anterior dorsum smoothly curved 3
3. 20–26 abdominal setigers present *T. parvus*
- At least 30 abdominal setigers present 4
4. Branchiae free almost to base *T. klemani*
- Branchiae fused for most of their length *T. lanai*

Terebellides klemani Kinberg, 1867

Fig. 1a–f

Terebellides klemani Kinberg, 1867:346.—Hartman, 1948:14.

Terebellides anguicomus.—Hessle, 1917:141, fig. 33a–c (in part, not *T. anguicomus* Müller, 1858, see below).

Material examined.—Three syntypes, RM 975(1) and 976(2), *Eugenie* Expedition sta. 180. Atlantic Ocean: 22°30'S, 40°55'W; 36–73 m.

Comments on material examined.—The three available specimens are all in poor condition. One (here called 976b) is posteriorly incomplete and has a damaged prostomium and branchiae. The other two specimens are complete. All three specimens have crystals imbedded in the epidermis making observation of some structures very difficult. Staining with methyl blue failed to improve the resolution of such features as the numbers of hooks present. The description is based on the larger of the two complete specimens (976a) with comments on the other specimens where appropriate.

Description.—Syntype 976a with 18 thoracic and 32 abdominal setigers; length 23 mm, measured from the posterior edge of the prostomium. Syntype 976b posteriorly incomplete, with 18 thoracic and 37 abdominal setigers; length 35 mm. Syntype 975 with 18 thoracic and 30 abdominal setigers; length 9.6 mm.

Prostomium large and folded; many tentacles of two different widths. Tentacles of other two specimens all similar in width. Elongated nephridial papillae present dorsally on either side of base of branchial stalk.

Branchiae appearing 5-lobed; both superior lobes projecting forward. Branchial lobes free almost to the base of the stalk. All lobes similar in size and width. In syntype 975 inferior lobes conspicuously slenderer than other lobes and fused for $\frac{1}{3}$ of their length. Posterior edge of each branchial lamella with slender papillar projections in a single row (Fig. 1a).

First two parapodia located slightly dorsal to next following parapodia (Fig. 1a). Lateral lappets with rounded ear-like projections in setiger 1; projections increasingly inconspicuous in setigers 2–3. Abdominal neuropodial tori fringed by single rows of uncini. Posterior segments crowded making neuropodia increasingly crowded towards posterior end.

Pygidium conical; anus terminal; surrounded by several blunt papillae.

Notopodial setae of setiger 1 few in number and short; more numerous and well developed from setiger 2 on. All notosetae long, distally pointed, delicately limbate and capillary. Four large, distally pointed, curved and retractile acicular spines present in neuropodium 6 (Fig. 1b); tips easily broken. Neuropodia with single rows of curved uncini with large main fangs and numerous secondary teeth in setigers 7–18 (Fig. 1c, d). Number of uncini per row 10–14 in all thoracic neuropodia in all three specimens. Each abdominal neuropodium with a single row of about 35 avicular multidentate uncini (Fig. 1e, f).

No tubes present in material.

Methylene blue staining pattern transverse stripes on 11 anterior setigers in syntype 975; absent in syntypes 976a and 976b.

Discussion.—Hartman (1948) examined these specimens and apparently recognized them as the types of Kinberg's species even if she did not report on the species. The

relationship between this species and the similar *T. anguicomus* is discussed below. The species is currently known only through the original record by Kinberg (1867) from the Brazilian coast, but as indicated below, at least some of the records of *T. anguicomus* may belong to this species.

Terebellides anguicomus Müller, 1858

Fig. 1g–i

Terebellides anguicomus Müller, 1858:218, pl. 7, figs. 22–25.—Hessle, 1917:141, fig. 33a–c (in part).

Material examined.—Sta. 6290, Operacao Sueste II, R/V *Almirante Saldanha*, 24°06'0"S, 46°10'0"W, col. Operacao Sueste II, 31 May 1983, 35 m (USNM 131993, 1); sta. 7, Ponta do Maciel, Baia de Paranagua, 25°34'00"S, 48°25'00"W, col. Paulo Lana, 1 Jul 1986, 18 m (USNM 131994, 1); sta. 3, Ilhas Gereres, Baia de Paranagua, 25°29'00"S, 48°35'00"W, col. Paulo Lana, 2 Oct 1986, 10 m (USNM 131995, 1); sta. 2, Ponta da Cruz, Baia de Paranagua, 25°29'48"S, 48°29'30"W, col. Paulo Lana, 7 Nov 1981, 16 m (1, neotype USNM 131996).

Comments on material examined.—The material collected by Müller (1858) is no longer available (cf. Jones 1977:249). We obtained, thanks to Dr. Paulo da Cunha Lana, some specimens from the Brazilian coast which we consider close enough to the type locality to constitute authoritative material for the redescription of the species. The redescription is based on all four specimens; the designated neotype is indicated above.

Description.—All four specimens complete; varying in length from 15.4 to 62 mm. Thorax with 17 setigers; abdomen with 40 to 42 setigers. Nephridial papillae in groove medial to rudimentary parapodia of segment 2, close to branchial base; each papilla long and cylindrical. Dorsum with a large, transversely oriented hump on setiger 5 (Fig. 1g).

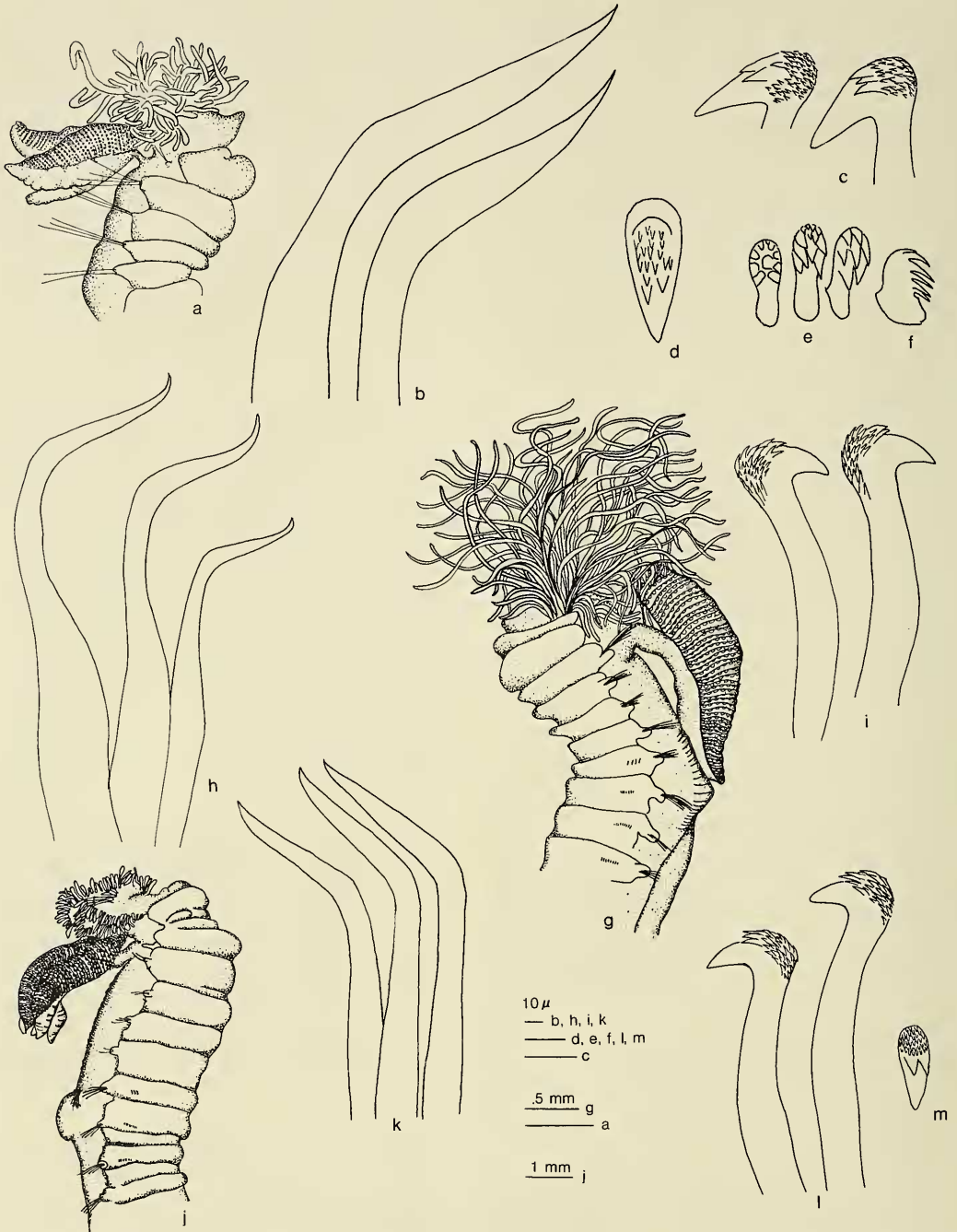


Fig. 1. *Terebellides klemani*, syntype 975: a, Anterior region, lateral view; b, Syntype 976b, neurosetae of right setiger 6; c, Syntype 976a, thoracic neurosetae of setiger 12, lateral view; d, Same from above; e-f, Same, abdominal uncini, frontal and lateral view. *Terebellides anguicomus*, neotype (USNM 131996): g, Anterior region, lateral view; h, Same, neurosetae of right setiger 5; i, Thoracic neurosetae, right setiger 8. *Terebellides carmenensis*, holotype (USNM 131989): j, Anterior region, lateral view; k, Same, neurosetae of left setiger 6, lateral view; l, Same, thoracic neurosetae, left setiger 15, lateral view; m, Same, from above.

Branchial lobes fused for most of their length. Inferior lobes much slenderer than superior ones. Both superior lobes tapering anteriorly; project forward; giving branchiae a 5-lobed appearance (Fig. 1g). Distal posterior region of each lamella with a row of slender papillar projections.

Parapodia of segments 2 and 3 (an aseptigerous segment plus setiger 1) shifted dorsally in relation to other parapodia. Lateral lappets with well developed, ear-shaped projections from segment 2; projections are distinctly reduced by setiger 2; becoming increasingly smaller over next few parapodia.

Notopodial setae best developed in setiger 1; forming two or three very short rows of 10 to 20 long, finely limbate, pointed, slender capillaries. Four retractile spines present in neuropodium 5. Each spine bent at almost a right angle with a slender, curved tip (Fig. 1h). Long thoracic uncini in a single row of 6–8 in a torus; with a main fang, three secondary teeth and large numbers of tiny denticles (Fig. 1i). Abdominal tori with short multidentate uncini in single rows. Number of uncini varying between 19 and 49 per torus.

Anus terminal, surrounded by several blunt papillae.

Methylene blue staining pattern consisting of transverse stripes present on first 11 segments (ten setigers).

No tubes were present.

Discussion.—A characteristic feature of this species is the complete lack of notosetae in segment 2, making the number of thoracic setigers 17, rather than 18 as in all other species; the presence of lateral lappets with ear-shaped projections on segment 2 indicates that the first parapodia-bearing segment is aseptigerous, corresponding to setiger 1 in the other species here considered.

Terebellides anguicomus has statistically distinctly fewer abdominal uncini per setiger than the other species here described. The numbers of both thoracic and abdominal uncini are significantly correlated with the size of the specimens.

A large dorsal hump is present in Müller's (1858) illustration of the species. This feature is present in this species and in *T. carmenensis*, new species; the relationship between these two species is further explored below.

Habitat.—*Terebellides anguicomus* has been reported from a variety of shallow water habitats along the Caribbean coast in sandy mud (Amaral 1980); how much of these reports refers to this species or to the other closely similar species described here is unknown. The organisms used in this study were found in silty and sandy sediments.

Distribution.—Brazilian coast, ?Caribbean Sea.

Terebellides carmenensis, new species
Fig. 1j–m

Terebellides cf. *klemanii*.—Hernández-Alcantara, 1985.—Hernández-Alcantara & Solis-Weiss, 1991.

Material examined.—Sta. 4, San Julian (Boca de Puerto Real), Isla del Carmen, Campeche, Mexico. (Holotype USNM 131989.)

Description.—Holotype complete; with 18 thoracic and 37 abdominal setigers; 28.1 mm long and 2.8 mm wide; ovigerous with abdominal and part of thoracic body cavity filled with eggs.

Prostomium elongated; 2.6 mm in length. Nephridial papillae in groove between first notopodial bases and branchial stem (Fig. 1j). Large transverse hump on dorsum of setiger 7 (Fig. 1j).

Branchial lobes with long stalk; fused for most of their length. Two inferior lobes as wide as two superior ones. Branchial lamellae with distal row of slender papillar projections. Anterior extensions of superior lobes fused and tapering distally; giving branchiae a 5-lobed appearance.

Parapodia 3 and 4 shifted ventrally in relation to other parapodia. Rounded ear-shaped projections of lateral lappets best developed in setigers 1 and 2.

Notopodial setae of setiger 1 few in number and smaller than those of setiger 2. All notopodial setae slender, bilimbate, distally tapering, and narrow capillaries. Seven large retractile, double-curved acicular spines (Fig. 1k) present in neuropodium 6. Two paratypes with seven spines, two additional paratypes with six and five, respectively. Neuropodia 7 to 18 with single rows of about 12 long handled hooks. Each hook with main fang, two secondary teeth and many minute denticles distally (Fig. 1l, m). Each abdominal neuropodial torus with a row of 45 to 48 avicular multidentate uncini in holotype. In paratypes number of uncini in a torus varying from 39 to 54; apparently independent of size.

Segments crowded towards posterior end of the body. Pygidium a short cone. Anus terminal; surrounded by several blunt papillae.

No tube was found associated with this species.

Methylene blue staining pattern transverse stripes on first eleven setigers.

Discussion.—*Terebellides carmenensis* and *T. anguicomus* both have a conspicuous hump on the dorsum. In *T. carmenensis* the hump is on setiger 7 and in *T. anguicomus* it is on setiger 5. In addition, the latter lacks notopodial setae in segment 2; such setae are present in *T. carmenensis*.

The number of abdominal uncini per setiger is much larger in this species than in any other species examined in this study.

Habitat.—*Terebellides carmenensis* has been found in very shallow waters, associated with mangrove vegetation, in soft sediments (about $\frac{2}{3}$ mud and $\frac{1}{3}$ sand), at the entrance of Laguna de Terminos (Mexico).

Etymology.—The species is named for the area in which it was collected (Southeast of Isla del Carmen).

Terebellides parvus, new species

Figs. 2a–f, 3, Table 1

Material examined.—M-1 (USNM 131925, 5 paratypes); M-2 (USNM 131926,

42 paratypes); M-3 (USNM 131927, 16); M-5 (USNM 131928, 32 paratypes); M-6 (USNM 131929, 13 paratypes); M-7 (USNM 131930, 4 paratypes); M-8 (Australian Museum, 21 paratypes); M-9 (USNM 131931, 5); M-10 (USNM 131932, 2 paratypes); M-11 (USNM 131933, 10 paratypes); M-12 (BM(NH) 11 paratypes); M-13 (USNM 131934, 1); M-16 (Zoological Museum, Hamburg, 5 paratypes); M-20 (USNM 131935, 1 paratype); M-24 (USNM 131936, 2); M-25 (USNM 131937, 19); M-26 (USNM 131938, 11); M-27 (Allan Hancock Foundation, 8 paratypes); M-28 (USNM 131939, 9 paratypes); M-31 (USNM 131940, 2); M-34 (USNM 131941, 1); M-35 (USNM 131942, 3); M-36 (USNM 131943, 2); M-39 (USNM 131944, 4); M-40 (USNM 131945, 5 paratypes); M-41 (USNM 131946, 5); M-42 (USNM 131947, 17); M-45 (USNM 131948, 1 paratype); M-46 (USNM 131949, 1); M-47 (USNM 131950, 1); M-51 (USNM 131951, 2); M-52 (USNM 131952, 7); M-53 (USNM 131953, 36); M-54 (USNM 131954, 1); M-55 (USNM 131955, 1); M-58 (USNM 131956, 1); M-59 (USNM 131957, 3); M-60 (USNM 131958, 6); M-63 (USNM 131959, 1); M-65 (USNM 131960, 3); M-68 (USNM 131961, 2); M-69 (USNM 131962, 3); M-71 (USNM 131963, 2); M-75 (USNM 131964, 2); M-80 (USNM 131965, 30); M-81 (USNM 131966, 38 paratypes); M-84 (USNM 131967, 1); M-88 (USNM 131968, holotype and USNM 131969, 10 paratypes); M-90 (USNM 131970, 2); M-94 (USNM 131971, 3); M-95 (USNM 131972, 7); M-96 (USNM 131973, 58); M-100 (USNM 131974, 6); M-101 (USNM 131975, 5); M-107 (USNM 131976, 4); M-133 (USNM 131977, 6); M-139 (USNM 131978, 3); M-140 (USNM 131979, 14); M-141 (USNM 131980, 5); M-142 (USNM 131981, 5); M-143 (USNM 131982, 16 paratypes); M-144 (USNM 131983, 1); M-145 (USNM 131984, 12 paratypes); M-146 (USNM 131985, 3); M-147 (USNM 131986, 24 paratypes); M-148 (USNM 131987, 2); M-150 (USNM 131988, 2).

Description.—Holotype female with 18 thoracic and 25 abdominal setigers; 21.5 mm long and 2.5 mm wide; with prostomium and tentacles 27.5 mm long. Nephridial papillae located between base of first parapodium and base of branchial stalk.

Branchial lobes (Fig. 2a) with short stalks; stalks fused basally in holotype; lower half fused in some paratypes. All branchial lobes similar in size and shape in holotype; two inferior lobes considerably slenderer than superior ones in some paratypes. Superior branchial lobes anteriorly fused, prolonged and tapering, giving branchiae a 5-lobed appearance. Posterior edge of branchial lamellae with a distal row of small papillar projections.

First two parapodia shifted dorsally in relation to next following ones. Lateral lappets with distinct rounded ear-shaped projections in setigers 1, 2, and 3; projections are reduced over the next several setigers. Projections cover bases of notopodia in setiger 2 (Fig. 2a).

Notopodial setae of setiger 1 small and few in number; all notopodial setae slender, distally tapering, narrowly bilimbate capillaries. Five long retractile acicular spines present in setiger 6; each spine bent almost at a right angle, tapering to fine, slightly up-tilted tips; small specimens have 3–4 spines (Fig. 2b). Setigers 7–18 have single rows of about 12 long-handled hooks. Each hook with a large main fang, two secondary teeth and a crest of many tiny denticles (Fig. 2c). Each abdominal neuropodial torus with a single row of usually 18–37 avicular multidentate uncini (Fig. 2d–f). Variability in number of hooks discussed below.

Posterior ends, including last 10 setigers held reflexed over dorsum when removed from tubes. Anus terminal, surrounded by several blunt papillae.

Tubes with a thin, flexible inner lining covered with plant debris and sand grains of varying sizes.

Methylene blue staining pattern transverse stripes in first eleven setigers.

Discussion.—The number of abdominal

setigers present varies as illustrated in Fig. 3 and Table 1; specimens with fewer than 21 abdominal setigers are never mature. Below this number, there is a strong correlation between the size of the specimens and the number of abdominal setigers present; above this number, any correlation is rapidly lost.

The number of papillar projections on branchial lamellae appears to vary independent of the size and degree of maturity of the specimens. The number of acicular spines varies from 3 to 8 and is poorly related to the size of the specimens; small specimens have few acicular spines, but so do some of the large specimens.

The species is distinguished from closely related species by the low number of abdominal setigers and by the lack of a visible hump on the dorsum.

Habitat.—Found in root mats of *Rhizophora mangle* in very shallow water of normal salinity.

Etymology.—The name refers to the reduced number of abdominal setigers.

Terebellides lanai, new species

Fig. 2g–i

Material examined.—Sta. 6139, Operacao Sueste I, R/V *Almirante Saldanha*, 24°16'00"S, 46°01'02"W, col. Operacao Sueste I, R/V *Almirante Saldanha*, 21 Aug 1982, 45 m (holotype USNM 131990, 1 paratype USNM 131991); sta. 607B, Operacao Sueste I, R/V *Almirante Saldanha*, 26°51'00"S, 46°13'01"W, col. Operacao Sueste I, 2 Aug 1982, 50 m (2 paratypes, USNM 131992).

Description.—Holotype female with 18 thoracic and 38 abdominal setigers; 20 mm long and 1.5 mm wide.

The prostomium is large, with many long, slender tentacles (Fig. 2g). Nephridial papillae attached immediately medial to first notopodia; long, distally truncate cones; folded down in groove between first notopodia and base of branchial stalk.

Branchial lobes fused for most of their

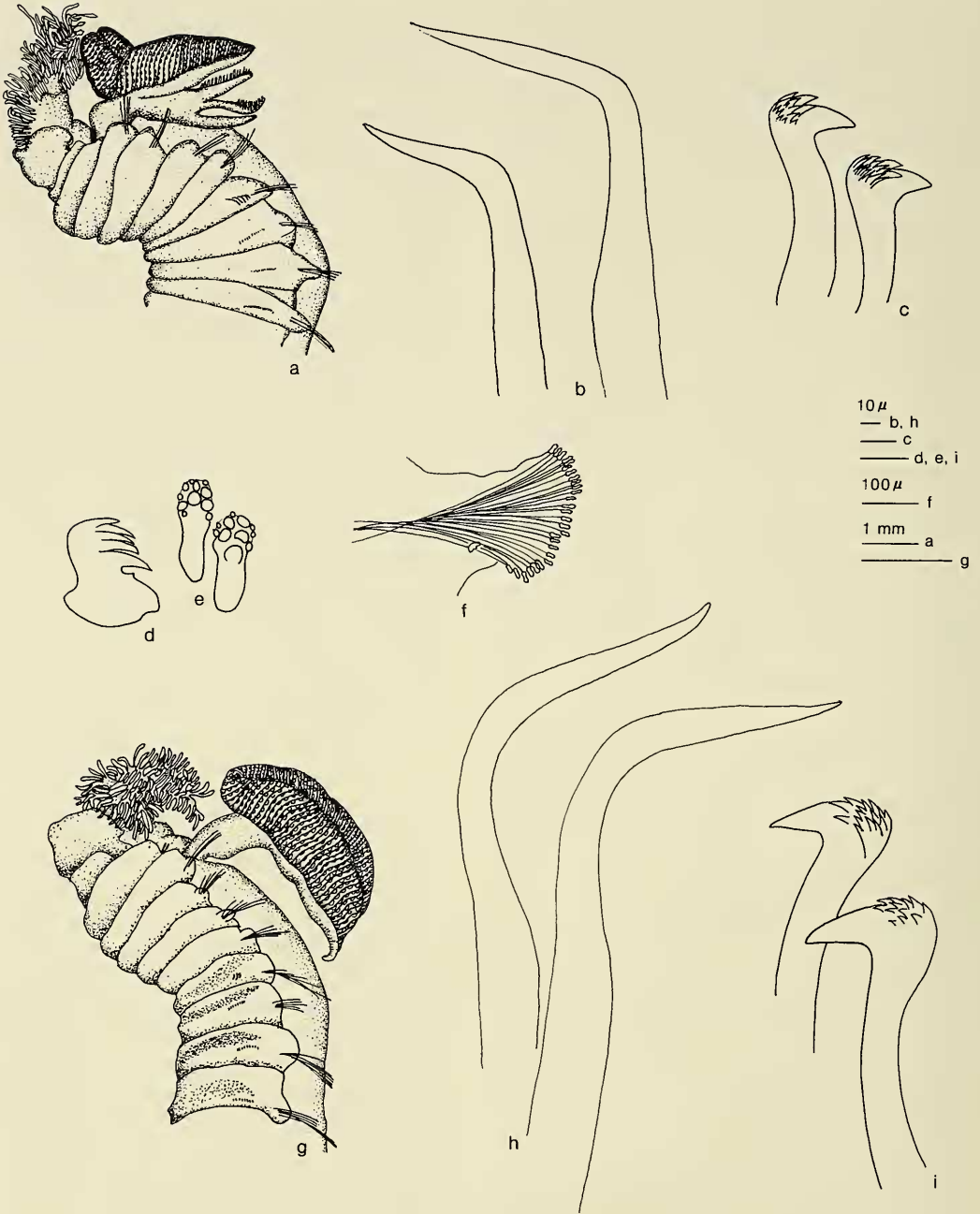


Fig. 2. *Terebellides parvus*, holotype (USNM 131968): a, Anterior region, lateral view; b, Same, neurosetae of left setiger 6; c, Same, thoracic neurosetae of left setiger 14; d, Same, abdominal uncus of setiger 25, lateral view; e, Same, frontal view; f, Same, abdominal parapodium, setiger 25. *Terebellides lanai*, holotype (USNM 131990): g, Anterior region, lateral view; h, Same, neurosetae of left setiger 6; i, Same, thoracic neurosetae of left setiger 17.

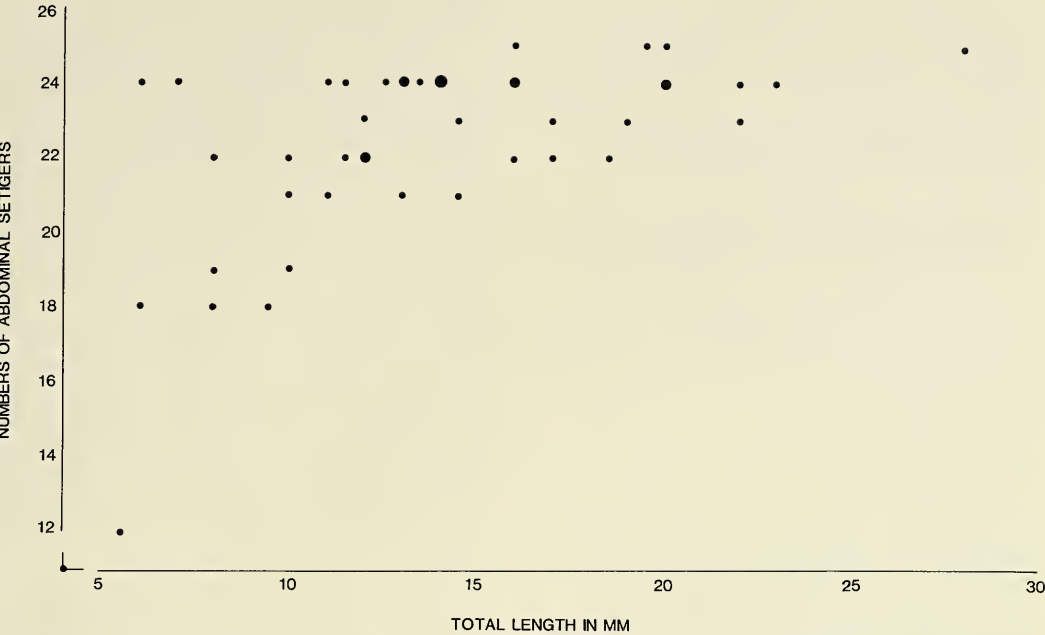


Fig. 3. Relation between total length and number of abdominal setigers in *Terebellides parvus*. The small dots represent single specimens, the larger dots two and three specimens, respectively.

length. Inferior lobes are slenderer than superior ones. Superior lobes tapering anteriorly; projecting forward; giving branchiae a 5-lobed appearance. Branchial lamellae with single row of small slender papillae near posterior edge.

Lateral lappets of first 5 setigers with rounded projections. Projections on setigers 1–2 largest; projections on setiger 3 slightly smaller than those on setigers 4–5 (Fig. 2g).

Notopodial setae of setiger 1 small and few in number; notosetae much larger and more numerous in second and following setigers. Notosetae slender, tapering, marginally narrowly limbate capillaries. Four large, distally pointed, retractile acicular spines in neuropodia of setiger 6 (Fig. 2h); each spine bent at nearly right angles and distally up-tilted. Neuropodia of setigers 7 to 18 with single rows of 8–10 long-shafted uncini. Most uncini with large main fangs and a crest of many denticles (Fig. 2i); in some uncini recognizable differentiation into 3 secondary teeth and crest of smaller teeth.

Abdominal neuropodial tori with single row of 25 to 29 avicular multidentate uncini. Segments increasingly shorter and crowded towards pygidium; tori increasingly elongate posteriorly.

Table 1.—*Terebellides parvus*, new species. Summary statistics for relation between numbers of abdominal setigers and total length of specimen.

	Abdominal setigers	Total length
Maximum	25	28
Minimum	12	5.5
Mean	22.44	13.92
SD	2.48	5.00
Regression analysis		
Constant		−11.5086
SE of Y est		4.183815
R squared		0.31624
No. of observations		45
Degrees of freedom		43
	X Coefficient(s)	SE of coef.
	1.1332	0.2541

Anus terminal; fringed by several blunt papillae.

No tube currently associated with specimens.

Methylene blue staining without distinct pattern.

Discussion. — *Terebellides lanai* is distinguished from closely related species by having the branchiae fused for most of their length, a feature it shares with *T. anguicomus*. However, it lacks the dorsal hump present in the latter and has notopodial setae in 18 rather than in 17 thoracic segments as in *T. anguicomus*.

Habitat. — Tropical shallow waters, muddy and sandy sediments.

Distribution. — Known only from the type localities on the Brazilian coast.

Etymology. — Named for Dr. Paulo A. da Cunha Lana, eminent Brazilian polychaetologist. He provided the type material used in this study and has been a great help for all of us, especially the third author, on several occasions.

Overview of the Species Treated

The five species recognized in this study belong to the tropical group characterized by Williams (1984) as having forward branchial extensions and ear-shaped or rounded dorsal projections on one or more lateral lappets. Our material came from localities well within the ecological and geographical distribution pattern postulated for this group by Williams.

In addition the species resemble each other in that the first two parapodia are displaced dorsally in relation to those in the next following setigers.

Furthermore, we found a fringing row of papillar projections (=small tubercles) along the posterior region of the branchial lamellae in all five species. An examination of type material of other species of *Terebellides* deposited in the USNM showed that this feature is not present in all the species. Pa-

pillae are present in *T. reishi* Williams and in *T. californica* Williams; in the latter they are wider and flatter than in other species examined. Papillae are absent in *T. atlantis* Williams, *T. distincta* Williams, *T. eury-stethus* Chamberlin, *T. japonica* Williams and *T. stroemi* Sars (observations on the latter not made on type material). The branchial papillae are difficult to observe unless the specimens are stained, and may for that reason have been overlooked by previous workers. The branchial papillae may turn out to be a useful additional character at the species level. The branchial papillae have so far been found only on species from shallow or shelf depths in relatively warm water; all species without papillae come from slope depths or from cold water.

All five species have low numbers of notosetae in setiger 1 (segment 2). We agree with Williams (1984) that the development of the notosetae in segment 2 is an important feature in the genus; thus the total absence of such setae in *T. anguicomus* must be considered an important character-state. Future analysis may show that the development of these setae form a transformation series, but at this time, it would be inappropriate to attempt an analysis of a small subset of the described species.

Other setae, including the neuropodial spines in setiger 6 (5 in *T. anguicomus*), are very similar in all five species.

Terebellides klemani and *T. anguicomus* may also be distinguished from each other by the presence of a distinctive dorsal hump in the latter; such a hump is also present in *T. carmenensis*, but on another setiger.

The staining pattern with methylene blue was of limited use: when present, it takes the form of transverse stripes across the first 11 segments. It was absent in *T. lanai* but very clearly seen in all specimens belonging to *T. anguicomus*. In *T. klemani*, it was clearly seen only in the smallest specimen, although in this case, its absence in the other specimens might be due to their deteriorated state. In *T. carmenensis* and *T. parvus*,

the staining pattern could be seen in most specimens.

Within each species the number of abdominal setigers varies very little with size in mature specimens (cf., Williams 1984, fig. 3). In small (immature) specimens the number of abdominal setigers varies with the size of the specimens. The character can be used safely in separating mature adults and also as a supportive feature for the identification of large immature specimens. In addition, the numbers of uncini in each abdominal torus appear to vary within narrow limits in each species. A more careful analysis may show that this character will also be useful for identifying at least adults.

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